

## METHOD AND SYSTEM FOR MERGING SCAN FILES INTO A COLOR WORKFLOW

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### BACKGROUND OF THE INVENTION

#### FIELD OF THE INVENTION

The invention relates to document scanning in a network environment. More particularly, the invention relates to a simplified method and system for merging scan files into a color workflow wherein the scan files are merged with document files on a page basis and job properties applied to the resulting merged document.

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#### DESCRIPTION OF PRIOR ART

In print shop environments, it is often necessary to combine electronic images created by scanning hard copy documents with an existing document file to produce a new document consisting of the images interspersed with the pages of the previous document in a desired order. For example, in the production of an illustrated calendar, photographs may be scanned to produce the calendar illustrations. The scans are then interleaved with the calendar pages, which may have been produced in a page layout program or a word processor. Subsequently, additional layout may be specified such as imposition or single-sided vs. duplex printing. Additional job options are specified, such as resolution, color profile and print profile and the document is output to a color printer. Thus, the production of such a document is a highly repetitious and time-consuming operation, and it requires a complex, multi-step workflow. Since print shops are production-type environments, there is an ongoing interest in increasing efficiency without sacrificing quality.

Various hardware components for accelerating the printing process are reported in the art. For example, T. Willems, and F. Tunissen, *Raster Image Processor*, U.S. Patent No, 4,891,768 (January 2, 1990) and T. Willems, and F. Tunissen, *Front-end System*, European Patent Application No. 0218287  
5 (September 27, 1985) both disclose hardware configurations that utilize a raster image bus to accelerate the processing of information so that a higher throughput is provided to the print device. J. Menendez, W. Caterisano, and J. Ball, *High Speed Image Processor Particularly Suited for Use in an Image Management System*, U.S. Patent No. 5,113,494 (May 12, 1992) also describe  
10 an improved raster image processor capable of providing output to a printing device at higher speeds than previously possible. The improvement is achieved by performing various image processing operations in parallel that had previously been performed serially. The disclosed devices do enable higher throughput of data to a printing device, but they don't address the problem of  
15 simplifying and accelerating complicated printing workflows, or of automating repetitive operations.

W. Neale, *A new generation of COM recorder brings new applications and opportunities*, International Journal of Micrographics and Optical Technology,  
20 v.14:5 (1996) discloses methods for transferring scanned bitmap images and merged documents to microfilm. The disclosed methods do not address the need in the art for accelerating the workflow by providing simple intuitive methods of merging document files and specifying job options.

Consequently, there is a need in the art for merging document files of various  
25 formats into a single workflow. It would be a further advantage to provide a means of merging scan files with document files on a page basis so that a new, merged document results. It would be desirable to provide a graphical user interface that allowed a user to produce such merged documents in a simple,  
30 intuitive manner. It would be advantageous to provide a simple way of

specifying merging instructions and other job options in the form of merge templates that can be created, saved and reused for future jobs.

It would be highly advantageous to implement such methods in a network scanning environment that allowed a user to specify multiple destinations and formats for a scan file. The capability of applying image modifications to scan files prior to merging would be highly desirable. Finally, a software application that allowed a scanner and a print device together to function as a copying machine would be desirable.

### SUMMARY OF THE INVENTION

The invention provides a method and system for document scanning in a network environment. A graphical user interface allows scan files to be merged with other document files into a printing workflow. The user creates and applies a set of merging instructions by selecting desired pages from the files to be merged and dragging and dropping thumbnail images of the selected pages from a source document to a destination document so that a new, merged document is created. In another embodiment of the invention, merge templates having predefined merging instructions are selected and applied to the desired pages. The templates may be created by saving previously generated merging instructions. In other embodiments of the invention, scripted merge templates are created manually, or by means of a workflow application, and then applied to a set of selected pages.

The system architecture includes a color print server with an attached scanning device and a client workstation in communication with the color print server. In one embodiment of the invention, scanning software is run locally on the color print server, and may be accessed through a GUI. In other embodiments of the invention, the interface may be an LCD interface on the color print server. In still

other embodiments of the invention, the color print server is embedded in a color printing device and may be accessed through the control panel of the printing device. In an alternate embodiment of the invention, the scanning software is run remotely from the client workstation. Scans are initiated at the color print server and the resulting files are stored in a mailbox carrying a numerical designator on a mass storage device connected to the print server. After scanning, the scan file may be retrieved and modified. In a further embodiment of the invention, a scanning device is connected to a client workstation. A user interface is provided that permits the scanner and a print engine attached to the color print server to be used together as a copying machine.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 provides a block diagram of a method for merging scan files with document files on a page basis, according to the invention;

Figure 2 illustrates a graphical user interface of a job management utility for merging document files on a page basis, according to the invention;

Figure 3 provides a block diagram of a system for color scanning in a network environment, according to the invention;

Figure 4 provides a block diagram of an alternate architecture for the system of Figure 3, according to the invention;

Figure 5 provides a block diagram of a further alternate architecture for the system of Figure 3, according to the invention;

Figure 6 shows a user interface for initiating a network scan in a scanning software application, according to the invention;

Figure 7 shows a user interface for initiating a local scan in the scanning software application of Figure 6, according to the invention;

- 5 Figure 8 shows a user interface for retrieving scan files in the scanning software application of Figure 6, according to the invention;

Figure 9 shows a user interface for viewing and modifying document scans in the scanning software application of Figure 6, according to the invention;

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Figure 10 shows a user interface for viewing and modifying image scans in the scanning software application of Figure 6, according to the invention;

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Figure 11 shows a user interface for using a scanner and a color printer as a color copier in the scanning software application of Figure 6, according to the invention; and

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Figure 12 shows an LCD interface for initiating and modifying scans on a color print server, according to the invention.

### **DETAILED DESCRIPTION**

The invention provides a method for merging document files on a page basis.

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Pages are selected from two or more document files and the selected pages are combined into a new, merged document. The resulting document file may subsequently be viewed, archived or printed.

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Referring now to Figure 1, a scanning device 10 is provided. As further described below, the scanner may be local to a workstation or it may be accessed over a network connection to a color print server. In a preferred

embodiment of the invention, the scanning device is equipped with an automatic document feeder (ADF) to facilitate the scanning of multi-page documents. In other embodiments, the scanner may comprise the platen of a copying machine. To begin, the user places a document to be scanned in the scanning device 10, and initiates a scan 11 by executing a 'scan document' command from the GUI of a scanning software application, to be described in greater detail further below. In a preferred embodiment of the invention, the scan file is converted to a .PDF file. In other embodiments the scan file may comprise a raster data file, a bitmap file, or another page description format such as POSTSCRIPT (PS) or Page Construction Language (PCL). After the document is scanned the user directs the scan file to a job management utility. In the interface of the job management utility, thumbnail images of the separate pages of the scanned document are displayed 12. The user then retrieves another document file by selecting it from a displayed directory of document files. The pages of the second file are displayed as thumbnail images 13a. The second document may be another scan file or it may be an existing document file in any of the file formats previously mentioned. The user then selects pages from the two document files. In the preferred embodiment of the invention, page selection is accomplished by clicking the thumbnail image of the desired page with a mouse. However, other commonly known methods of selecting graphical objects may be substituted without departing from the spirit and scope of the invention. After the pages from each document are specified, the user then combines the pages according to a desired order by dragging and dropping the thumbnail images, until they are arranged in the desired order.

Figure 2 illustrates the process of selecting and combining pages. The user interface of a job management utility includes a multi-frame window 20. The upper frame contains Thumbnail 'B', representing a document having eight pages, although the user would have to scroll to the left to see the thumbnail of page one. As indicated by the arrow 22, page four (21a) from thumbnail 'B' is selected and dragged to the lower frame to become page four (21b) in

thumbnail 'A,' thus creating a new merged document 14. Subsequently, additional pages from Thumbnail 'B' may be added, and the pages may be reordered. Finally, the merged document may be previewed 15 or it may be routed directly to the print workflow without previewing. Additionally, the merged document may be archived as a new document file.

The user may elect to save the merging instructions generated during the creation of the merged document to a merge template. The resulting merge template may be selected and applied at a future time to other document files.

As an alternative to dragging and dropping page thumbnails, the user may select a predefined merge template from a menu of templates 13b. The predefined merge templates are generated in any of several ways. They can be generated as previously described, by saving merging instructions generated during the creation of a document. Additionally, the merging instructions may be scripted, either manually or through the use of a workflow software application. Several examples of scripted merging instructions are shown below:

Where A, B and C represent source documents:

- Example 1 – page order = A1 A2 A3 B1 B2 B10 A9 C20 C1 C2.
- Example 2 – page order = A1 B1 A2 B2 A3 B3 repeat pattern until end of one document.
- Example 3 – page order = C1 C2 A1 B1 A2 B2 ... A100 B100 C3 C4, etc.

Thus, a predefined page order may be applied to the selected pages in a single step, requiring a minimal amount of time and effort on the part of the user.

The merge template constitutes a valuable tool for accelerating and simplifying the printing workflow and its utility is not limited to specifying pagination in merged documents. The merge template may also incorporate instructions for imposition, the placement of multiple pages on a single sheet. For example, if the source pages were originally in an 8 1/2" x 11" format, the user may desire to print several pages on a single sheet, perhaps to publish the document in pamphlet or booklet form. The merge template may be used to include instructions for printing the document "four up," meaning four pages per sheet. The example immediately preceding is not meant to be limiting. Additionally, single-sided or duplex printing may be specified. The merge template may be used to specify any layout parameter or color setting that would be specified in the job ticket for a print job including:

- Source RGB
- Color profile
- Source type (image, text, graphics)
- Saturation
- True Color
- Smoothing or anti-aliasing
- Toner reduction, and
- Print modes.

Other applications of the merge template consistent with the spirit and scope of the invention will be apparent to those skilled in the arts of computer graphics and digital printing. Thus, based on past print jobs that have been successful, the user is able to specify multiple parameters and settings with a single selection simply by applying a predefined merge template incorporating all of the settings of the previous job that were successfully applied.

As described herein, the invention is embodied as a method and a system. Referring now to Figure 3, a block diagram of a system for implementing the invented method is shown. A color print server 30 is provided. Resident thereon is a scanning management software module 34 for managing scanning in a network environment. Connected to the color print server is a scanning device 31. In certain embodiments of the invention the scanner is a dedicated scanner equipped with an Automatic Document feeder (ADF). The scanning device 31 may also be the platen of a color copying machine. Also resident on the color print server is a scanning software application 35 having a user interface through which the user may perform various tasks related to document scanning, including:

- Source definition
- Set destination
- Save to network location
- Export to printstream
- Image modification during scanning; and
- Image modification post-scan.

In one embodiment of the invention, the interface constitutes a graphical user interface (GUI) on a display device connected directly to the color print server. In an alternate embodiment, the user interface constitutes an LCD interface mounted directly on the color print server. Figure 12 shows an exemplary LCD interface.

A client workstation 32 is in communication with the color print server 30. The job management utility 36 previously described resides on the client workstation.

Referring to Figure 6, shown is a dialog box 60 for initiating a scan on the color print server 30. A pull down menu 61 allows the user to specify the scan source. As previously mentioned the scanner may be either a dedicated scanner equipped with an ADF or it may be the platen of a color copier. In this case, the scan source is a color copier. Controls 62 and 63 are provided for specifying the source type, image or document. A pulldown menu 64 allows the user to specify the scan mode, the three options being:

- Color
- Black and white
- Photograph.

A pulldown menu 65 allows the user to specify scan resolution in pixels per inch (PPI). Checkboxes 66 and 67 allow the user to select or deselect 'Descrreen' and 'Auto-deskew.' A pulldown menu 68 allows the user to specify the number of sides that must be scanned, with the options being 'Single' and 'Both.' However, double-sided scanning is only supported in scanners having an ADF. In the example of Figure 6, scanning is performed from a color copier's image glass (platen) so the 'Sides' pulldown 68 is grayed-out. In Figure 7, a scanner equipped with an ADF is selected, and therefore the 'Sides' pulldown 68 is enabled. Additionally, page orientation 69 may be specified, the options being 'Vertical (portrait)' and 'Horizontal (landscape).' Finally, the user initiates the scan by clicking the 'Scan' button 70. As the scan is being performed, the video ASIC of the scan engine may apply a compression format to the scan data, or the scan may be saved directly to the drive of the color print server in a native file format. In the case of a color image, the scan may be converted to the .JPEG format, and in the case of a black & white image, the scan may be converted to the .JBIG format.

When the scan is complete, the scan file is temporarily saved to a mailbox 87 carrying a numerical designator on the drive of the color print server. After a scan is saved to its temporary location, the user may further specify a final destination for the scan file. Figure 8 shows a dialog 80 for retrieving scan files.

- 5 When the scan is saved to the mailbox 87, the scanning application assigns the scan file a default file name 81 and affixes a time and date stamp 82. In addition, the file size 83 is given. Thumbnail images 84 of the scan file provide a preview capability. A 'Save' button 86 allows the user to specify another destination for the scan file according to the following options:

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- import into the job management utility 36 – the scan application converts and stores the file as a .PDF file on the drive of the color print server, to be retrieved later by the job management utility 36 resident on the client workstation 32;

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- save to a network location of the user's choice in a file format specified by the user;
- the scanner application will send an email notification of the file's existence with a clickable hyperlink to the file's URL on the drive of the color print server;

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- the scan file may be faxed to a user-specified destination; and
- the scan file may be exported to the print stream.

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While the scanning application gives the scan file a default file name, the user may override this feature and assign a file name of their choice. Instead of specifying a destination for the scan file, the user may first view the file by clicking the 'View' button 85, whereupon the file is opened and displayed in a user dialog as shown in Figures 9 and 10. Figure 9 shows the interface for displaying a document file and Figure 10 shows the interface for displaying an image file. From the two dialogs 90, 100 the user is able to make a variety of

modifications to the scan file. Parameters to be modified may include one or more of:

- Resolution
- 5    • Scan mode
- Brightness
- Threshold
- Contrast
- Scaling
- 10   • Original image
- Color conversion
- Color profile
- Rotation
- Crop
- 15   • Unsharp mask
- Deskewing
- File format; and
- Compression.

20   After making image modifications, the user may then specify a destination, as previously described. Both dialogs 90 and 100 have controls for saving and specifying a destination 86 and canceling image modifications 91, sending e-mail notification 92 and doing a test print 94. Rather than specifying an alternate destination, the user may elect to hold the file on the color print server at its  
25   original location 93.

While the invention has thus far been described within the context of particular system architecture, other embodiments of the invention employing alternative system architectures are possible. For example, as shown in Figure 4, the

scanning application 35 may reside on the client workstation 32 rather than on the color print server 33. Thus, within this architecture, all user activities are initiated from the client workstation, although they are still executed on the color print server.

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In another system architecture, instead of a printer/scanner 31 connected to the color print server 30, a third party TWAIN scanner 52 is attached to the client workstation, as shown in Figure 5. A plug-in 53 resident on the client workstation 32 works with the third party scanning software to provide most of the functionality of the original scanning software. As shown in Figure 7, the user may specify a local TWAIN source, rather than a network scan. The TWAIN plug-in 53 and third party scanner 52 allow the color print server to be combined with an attached printer 51 to function as a color copier. As shown in Figure 11, a dialog 110 provides interface elements 111 and 112 to emulate the control panel of a color printer.

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According to a further alternate embodiment (not shown), the color printer server is embedded in a color copier, with the interface to the color print server comprising the control panel on the color copier.

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Although the invention is described herein with reference to a variety of preferred embodiments, one skilled in the art will readily appreciate that other applications may be substituted for those set forth herein without departing from the spirit and scope of the present invention. Accordingly, the invention should only be limited by the Claims included below.

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